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(54) **A beverage package and a method of packaging a beverage**

Eine Verpackung für ein Getränk und ein Verfahren zum Verpacken eines Getränkes

Emballage pour boisson et procédé pour emballer une boisson

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Description

TECHNICAL FIELD & BACKGROUND ART

The present invention relates to a beverage package and a method of packaging a beverage. It particularly concerns beverages having in solution gas, typically nitrogen and/or carbon dioxide, which is to be liberated to develop a head of foam or froth on the beverage for consumption.

The invention was primarily developed for the packaging of fermented beverages such as stout, lager, ale (or other beer) or cider although it is to be realised that it can be applied to the packaging of other alcoholic beverages, such as spirits and wines, or to non-alcoholic beverages such as so-called soft drinks, milk shakes and the like. In the packaging of beverages in a sealed container such as a can or bottle it is recognised that the presence of air or oxygen, particularly in a headspace of the container, can cause oxidation of the beverage and consequential adverse changes in its desirable characteristics (such as in the taste, bouquet or mouth feel). The presence of oxygen in close proximity with a beverage, even in relatively minute proportions of volume of oxygen to volume of beverage, can drastically shorten the shelf life of a sealed beverage package.

Consequently, considerable care and measures are taken in beverage filling lines, particularly for beer, in an attempt to remove air from the container prior to sealing or to ensure that the air/beverage ratio is at an acceptably low level consistent with achieving a desired shelf life for the package. A sealed package for beer desirably has a shelf life in the order of 10 to 12 months so that at any time during that period a consumer opening the package can expect a product which is substantially consistent in its desirable characteristics.

Many beverage packaging techniques have been developed and incorporated in container filling lines to alleviate oxygen contamination by the presence of air in the container when sealed. Conventional techniques include purging the empty container of air with nitrogen or other non-oxidising gas, charging the container with beverage and thereafter taking steps to alleviate the entry of air into the headspace which is formed prior to the container being sealed. These latter steps can include, for example, filling the container headspace with froth or foam to displace air therefrom, dosing the headspace with liquid nitrogen so that nitrogen gas evolves and displaces air from the headspace or directing nitrogen gas under pressure into the headspace as the container is capped or sealed.

A beverage package which has achieved considerable commercial success is that in which, upon opening the sealed container, gas in solution from the beverage is intentionally liberated within the container to develop froth or foam in the container headspace. This purposeful liberation of the gas, particularly nitrogen, in solution may be achieved by many techniques which we have developed and are now well known in the art. For example, the beverage can be subjected to ultrasonic stimulation or to an externally developed jet of gas or liquid (conveniently applied from a syringe) in accordance with the disclosure in our British Patent No. 1,588,624 or an internally developed liquid (beverage) and/or gas stream may be injected into the beverage in accordance with the disclosure in our British Patent No. 2,183,592A.

In beverage packages in which the gas in solution is intentionally liberated to form froth or foam in the headspace when the sealed container is opened, it is usual to ensure that the headspace is of an adequate size to accommodate the froth or foam which will develop (or which will develop in a reasonable time prior to the beverage being poured from the container, say into a drinking vessel) so that the likelihood of the froth or foam bubbling out of the container and the beverage thereby being wasted is alleviated. It is common practice therefore that the volume of the headspace of a container in which the gas in solution is, or is to be, intentionally liberated on opening the container is considerably greater than the headspace of a beverage container in which it is not intended that the gas in solution should be liberated purposely within the container. In a typical example, a beverage can containing 500 millilitres of beer having gas in solution which is not intended to be intentionally liberated on opening of the container may have a small headspace or vacuity in the order of 27 millilitres (in practice this means that with a conventionally proportioned beer can the headspace has a depth of approximately 8 millimetres). In comparison a similarly dimensioned beverage can may contain 450 millilitres of beer having gas in solution which is to be liberated intentionally within the can on opening so that its headspace is relatively large, say with an approximate volume of 70 millilitres and a depth of approximately 20 millimetres.

With conventional containers having small sized headspaces as aforementioned, the removal and/or exclusion of air/oxygen from the headspace prior to sealing can be achieved in a relatively simple and efficient manner on a high speed container filling and sealing line simply by blowing nitrogen gas across or through the headspace prior to and as the container is sealed. However, with packages having the relatively large volume and deep headspace as aforementioned, simple blowing with nitrogen gas has been found unacceptable to ensure adequate removal of air/oxygen from the sealed container. Consequently to achieve this latter aim it is usual to employ additional de-gassing techniques and a currently popular air/oxygen purging step is to introduce a dose of liquid nitrogen into each container in the packaging line. The nitrogen gas which evolves from the dose displaces air from, and alleviates the entry of air into, the headspace so that such air/oxygen as may remain in the headspace is within acceptable tolerances as the container is sealed. The liquid nitrogen dose may also serve to pressurise the contents of the container when the latter is sealed.

However, liquid nitrogen dosing is an expensive facility in a packaging line both in installation costs and run-

ning/consumable costs. Also it is disadvantageous in so far as it restricts the speed at which a packaging line can run and it is difficult to ensure, on a continuously moving line of containers, that the dose of liquid nitrogen which is introduced into the headspace of each container is consistent within predetermined tolerances (so that if the liquid nitrogen dose serves to pressurise the container when sealed, it is difficult to maintain consistency in the internal pressures of the sealed containers which issue from the packaging line). It is an object of the present invention to provide a beverage package and a method of packaging a beverage in which the beverage in the package contains gas in solution that is intentionally or purposely to be liberated to form froth or foam in a relatively large headspace of the container and which lends itself to alleviating the difficulties associated with conventional packaging techniques as discussed above.

STATEMENTS OF INVENTION & ADVANTAGES

According to the present invention there is provided a beverage package comprising a sealed container having a primary chamber accommodating beverage having gas in solution and which gas is to be liberated to provide froth or foam in a headspace of the primary chamber; froth developing means responsive to a pressure differential created by opening of the sealed container to liberate gas from solution in the beverage and form froth or foam in the headspace, and a relief chamber which is closed to communication with the beverage in the primary chamber when the container is sealed and is openable subsequent to said sealing and prior to opening of the sealed container whereby, on opening said relief chamber, a proportion of beverage derived from the primary chamber is accommodated in the relief chamber to enlarge said headspace for accommodating froth or foam developed therein.

Further according to the present invention there is provided a method of packaging a beverage having gas in solution which comprises providing a container with a primary chamber and a relief chamber which is closed to the primary chamber, providing the container with froth developing means, charging the primary chamber with the beverage and sealing the container to form a pressurised headspace in the primary chamber so that the froth developing means is responsive to a pressure differential created by opening of the sealed container for liberating gas from solution in the beverage to form froth or foam in the headspace of the primary chamber, and with the container sealed, opening the relief chamber to accommodate beverage derived from the primary chamber and thereby enlarge the headspace in the primary chamber for accommodating froth or foam developed by liberation of gas from the beverage on subsequent opening of the sealed container.

The relief chamber may be constructed integral with the container but more usually it will be formed as a hollow insert, typically of plastics, which is located within the container. Initially the relief chamber will be sealed or otherwise closed to communication with the primary chamber and will usually contain nitrogen gas (although other appropriate non-oxidising gas as will be known in the beverage packaging art may be used). With the relief chamber closed to communication with the primary chamber, the latter is charged with beverage to provide a relatively small volume headspace. This headspace can be relatively shallow or even negligible in size so that it is easily purged of atmospheric oxygen, for example by a conventional de-gassing technique where nitrogen or other non-oxidising gas under pressure is blown across the headspace prior to and during sealing of the container. After the container is sealed, the relief chamber is opened to communication with the primary chamber so that beverage from the latter enters the relief chamber and thereby causes an increase in the volume of the headspace in the primary chamber; such gas as may be in the relief chamber is released into the beverage and into the headspace. A larger volume headspace is now available to accommodate froth or foam which will be developed by the intentional liberation of gas, typically nitrogen, from the beverage. Understandably the increased volume headspace has to be available to accommodate the froth or foam created when the container is opened to dispense the beverage for consumption. It will be apparent from the aforegoing that the beverage package and the method of packaging of the present invention may permit the relatively small headspace which is initially provided to be purged efficiently of air/oxygen on conventional high speed container beverage filling and sealing lines while providing the advantage of a relatively large headspace to accommodate froth or foam derived by gas which is intentionally liberated from the beverage on opening the container.

It is most desirable that the relief chamber is arranged so that when it has opened to accommodate beverage from the primary chamber, the beverage from the relief chamber will be dispensed together with the beverage from the primary chamber when, for example, the beverage in the container is poured into a drinking vessel, thereby ensuring that the beverage in the relief chamber is not wasted.

The relief chamber may have a closure which responds to a treatment of the sealed beverage package (for example from heat applied during pasteurisation) that causes the closure to open the relief chamber to the primary chamber.

For example the relief chamber or a relevant part thereof may be formed of a plastics material the dimensions of which undergo a change (such as with heat shrink plastics) during pasteurisation and which change is adequate to open, or permit opening of, the closure. A further example may have the closure in the form of a bursting sheet/disc or a press fit cap which is subjected to a pressure differential between that in the relief chamber and that in the primary chamber (for example created as a result of the package passing through a pasteurisation process) and which is adequate to cause the sheet/disc to burst or the cap to be displaced to open the

relief chamber for the accommodation of beverage. In achieving this latter technique a non-return valve may be provided in the relief chamber so that a pressure increase in the primary chamber (for example, developed during pasteurisation) is transmitted, by way of the non-return valve, into the relief chamber and upon cooling of the container (following pasteurisation) the pressure in the primary chamber may reduce at a greater rate than that in the relief chamber so creating a pressure differential which is adequate to open the closure of the relief chamber. The closure when opened desirably maintains its open condition and preferably remains secure in the container (to ensure that it is not dispensed along with the beverage). It will be appreciated that many techniques may be employed for opening the relief chamber within the sealed container as an alternative to a reaction created by heat, for example the relief chamber may be arranged to open in response to ultrasonic stimulation or other vibration or external mechanical manipulation of the container, for example by peristalsis or centrifugal force.

It is usual for beverage packages of the kind to which the present invention relates to have the headspace of the sealed primary chamber pressurised with a non-oxidising gas, typically nitrogen as previously discussed. A facility afforded by the invention is that the closed and sealed relief chamber can contain nitrogen (or other appropriate non-oxidising gas) under pressure so that when that chamber opens to communication with the primary chamber the gas which it releases pressurises the headspace and contents of the container as required. This has the advantage that the container can be sealed following the beverage charge and with its small headspace at relatively low pressure (thereby alleviating the requirement for liquid nitrogen dosing to pressurise the container contents to a relatively high pressure).

The froth or foam developing means may comprise a secondary chamber from which liquid and/or gas is injected by way of a small aperture or non-return valve into the beverage in the container for the purpose of liberating gas from solution in the beverage in accordance with the disclosure in our British Patents Nos. 1,266,351 and 2,183,592A. The secondary chamber may be formed as a hollow insert similar to the disclosure in our British Patent No. 2,183,592A and both this chamber and the relief chamber may be formed as plastics mouldings. The secondary chamber may be discrete from the relief chamber although when these chambers are formed as plastics inserts they may be coupled or moulded together as a unified insert structure for convenience of being located and secured in the container. The secondary chamber may be disposed relative to the relief chamber so that the former acts, in response to the pressure differential as aforementioned, initially to liberate gas from solution in the beverage which is accommodated in the relief chamber. With this latter arrangement in mind the secondary chamber can be located within the closed or sealed relief chamber; this is convenient when the relief chamber is a hollow plastics insert which can readily be fitted and secured in the container so that the relief chamber carries with it the secondary chamber. By having the relief chamber and the secondary chamber in the form of an insert structure (or as inserts) they can be purged of atmospheric oxygen and gasified (and if required pressurised with nitrogen or other non-oxidising gas) remote from the container so that they can merely be inserted into the container on a filling line to alleviate the requirement for specialised facilities on the filling line for purging air from the container and relief chamber (and the secondary chamber when provided) prior to the container receiving its beverage charge. The proposal in which the secondary chamber is located within, or to react in, the relief chamber is particularly beneficial since it permits the two chambers to be purged of air, pressurised with nitrogen (or other appropriate non-oxidising gas) and sealed to atmosphere by sealing the openable relief chamber prior to the relief chamber and secondary chamber being located as a unified insert in the container, thereby alleviating the possibility of either chamber being contaminated with atmospheric oxygen.

DRAWINGS

Embodiments of a beverage package and method of packaging a beverage in accordance with the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawings in which:-

Figure 1 diagrammatically illustrates one embodiment of the beverage package in a condition immediately following sealing of the container to provide a relatively small headspace;

Figure 2 shows the package of Figure 1 in a subsequent stage of processing in which the relief chamber as opened to accommodate beverage from the primary chamber to develop a relatively larger headspace, and

Figures 3 to 8 show further embodiments and arrangements of the beverage package in similar process stages to the package shown in Figures 1 and 2 respectively.

DETAILED DESCRIPTION OF DRAWINGS

The illustrated embodiments will be considered in relation to beverage packages in which beer, such as stout or lager, is packaged in a conventional, generally cylindrical can 1 having a primary chamber 1A formed by a domed base 2, a cylindrical side wall 3 and an openable top 4. The beer which is to be packaged contains nitrogen gas in solution and such gas is to be intentionally liberated on opening of the package for consumption of the beer. In the embodiments of Figures 1 to 6 the gas liberation is achieved internally of the container, by the automatic injection into the beer of a jet of gas and/or liquid in response to a pressure differential which is developed by the opening of the package so that such

injection liberates the gas in solution to create a froth or foam in a headspace. In the arrangement shown in Figures 7 and 8 the gas liberation is achieved externally of the container when opened, for example by ultrasonic stimulation or injection of gas or liquid from a syringe and as such this arrangement does not fall within the scope of the present invention. Conveniently the beer and the techniques for froth or foam development are substantially as disclosed in our British Patent Specifications 2,183,592A and 1,588,624 for Figures 1 to 6 and Figures 7 and 8 respectively and as such need not be discussed in detail herein.

Prior to its top 4 being fitted, the can 1 is displaced along a conventional beer filling line in an upstanding condition to provide an open top. The can is purged of air with nitrogen gas and receives through its open top a relief chamber 6 and, in the embodiments of Figures 1 to 6, a secondary chamber 5. The chambers 5 and 6 are formed by plastics moulded inserts or insert parts 7 and 8 respectively and are located on or towards the bottom 2 of the can 1. The inserts are retained in the can, conveniently, by flanges 9 which form a friction or interference fit with the side wall 3 of the can (although it will be appreciated that alternative forms of retention can be used such as magnetic or by suction cup). The inserts 7 and 8 in Figures 1 to 4 may be moulded independently of each other and conveniently such independent mouldings are coupled together for simultaneous location within the can as a unified insert structure.
Alternatively the secondary and relief chambers 5, 6 may be formed, predominantly, as a single moulding, particularly in Figures 5 and 6, for insertion into the container.

The secondary chamber 5 in the embodiments of Figures 1 to 6 communicates, or is to communicate, with beverage in or derived from the primary chamber 1A of the can by way of a restricted aperture or orifice 10 in the wall of its insert part 7 and this chamber 5 and orifice 10 are provided for the purpose of liberating gas from solution in the beer which is to be packaged in the can in the manner disclosed in G.B.-A-2,183,592.

In Figures 1 to 6 the insert part 8 is moulded of heat shrinkable plastics and includes a cap 11 which defines the relief chamber 6 with a wall 12 of the insert part 8. The cap 11 is secured to the wall part 12 by an integral hinge 13. As received by the can 1, the cap 11 is in sealed engagement with the wall part 12 to seal the relief chamber 6 and this chamber will have been purged of air and sealed to accommodate nitrogen gas under pressure of, say, 3 bar.

The secondary chamber 5 will also be purged of air and accommodate nitrogen gas - this purging and gasifying may have occurred prior to the insert part 7 for the secondary chamber being received by the can 1 or while that chamber is located within the can 1.

The open top can with its insert(s) 7, 8 fitted, passes to a filling station in which it is charged with a required measure of the beer 14 to provide a relatively small headspace 15. The can and its beer content passes along the packaging line to a sealing station where the lid or top 4 is fitted to the open top of the can and sealed by seaming in conventional manner to a mouth presented by the side wall 3. Prior to and during fitting of the can top 4, nitrogen gas under pressure is directed into and over the small headspace 15 to ensure that the headspace is purged of atmospheric oxygen and to alleviate the entry of air into the headspace.

Following sealing of the can 1, the beverage package thus formed is subjected to a pasteurisation process. As a result of the heat to which the package is subjected during pasteurisation the plastics material of the insert part 8 for the relief chamber 6 undergoes a transformation or deformation. This deformation causes the cap 11 to disengage from its sealed contact with the wall part 12 (and possibly causes a plastics retaining linkage, not shown, which retains the cap to break) and allows the cap to pivot on the integral hinge 13 in a sense to open the relief chamber 6 to communication with the primary chamber 1A and the beer therein. The small headspace 15 contains nitrogen gas at relatively low pressure, say 1.3 bar, imparted during the can sealing stage while the relief chamber 6 contains nitrogen gas under relatively high pressure. Therefore the cap 11 may be subjected to a considerable pressure differential between the nitrogen pressure within the relief chamber and the fluid pressure on the outside of that chamber which causes the cap to pivot to a fully open condition as shown in Figures 2, 4 and 6 while still being retained on the insert part 8 by the integral hinge. Furthermore, the integral hinge 13 may be structured to bias the cap 11 towards and maintain it in its fully open condition. As the nitrogen gas under pressure from the relief chamber 6 is released from that chamber and into the beer 14 in the primary chamber 1A and the headspace of that chamber, beer from the primary chamber 1A flows into and fills the relief chamber 6. As a consequence the headspace in the primary chamber 1A is enlarged as shown at 15A in Figures 2, 4, 6 and 8. In a typical example, the beer can 1 may have a nominal capacity of 500 millilitres and accommodate 450 millilitres of beer and the inserts are arranged so that the small headspace 15 will have a volume and depth in the order of 30 millilitres and 8 millimetres respectively while the enlarged headspace 15A will have a volume and depth in the order of 66 millilitres and 20 millimetres respectively.

In the embodiment of Figures 1 and 2 the nitrogen gas which is released from the relief chamber 6 pressurises the contents of the can including the secondary chamber 5 through the restricted orifice 10 in a similar manner to the disclosure in G.B.-A-2,183,592. As a consequence, when the sealed can is opened, typically by piercing, tearing off or displacing a portion of the can top 4 in conventional manner, for dispensing and consumption of the beer 14, the headspace 15A communicates with atmospheric pressure; this creates a pressure differential between that in the secondary chamber 5 and the beer 14 in the primary chamber 1A. Resulting from this pressure differential, gas and/or beer is displaced under pressure from the secondary chamber 5 and by

way of the restricted orifice 10 to be jetted into the beer in the primary chamber 1A causing gas in solution in the beer to be liberated for the development of froth or foam in the headspace 15A in a manner which is now well known in the art.

The enlargement of the headspace 15A will usually be adequate to accommodate the froth or foam which is developed or to accommodate sufficient froth or foam which is developed in a reasonable time to permit the beverage to be consumed or poured into a drinking vessel without wastage of the beverage bubbling from the opening in the top 4 of the can. It will be noted from the Figures that the cap 11 is displaced sufficiently from the open relief chamber to ensure that when the beer is poured from the can the relief chamber 6 can be emptied of beer along with the primary chamber 1A.

In the embodiments shown in Figures 3 and 4 and in Figures 5 and 6 the secondary chamber 5 is located so that it communicates by way of the restricted orifice 10 with beverage which will be received in the relief chamber 6.

In Figures 3 and 4 the insert part 7 for the secondary chamber 5 is located within the insert part 8 for the relief chamber 6 and similarly to the embodiment of Figures 1 and 2, the insert parts 7 and 8 may be moulded independently or integral with each other. In Figures 5 and 6 the insert part 7 for the secondary chamber 5 is structured externally of the relief chamber 6 and is arranged so that the orifice 10 of the secondary chamber 5 communicates with the relief chamber 6 in a partition wall 12A between those chambers; in this arrangement the insert parts 7 and 8 are preferably moulded integrally. A particular advantage of the insert arrangement shown in Figures 3 and 5 is that prior to location of the independent or unified insert parts 7 and 8 in the can 1, the secondary and relief chambers 5 and 6 can be de-gassified or purged of air and pressurised with nitrogen gas under pressure simultaneously so that this nitrogen gas pressure is maintained in both chambers 5 and 6 when the cap 11 is closed to seal the relief chamber 6. This degassing and pressurisation of the chambers 5 and 6 simultaneously can be effected at a position remote from the packaging line so that the composite pressurised insert can be supplied and located within the open topped can in a relatively simple manner on a conventional beer filling line. Following fitting of the composite insert as shown in Figures 3 and 5, the can is processed to complete the beer package and subjected to pasteurisation which causes the cap 11 to open the relief chamber 6 as shown in Figures 4 and 6 and in a similar manner to the embodiment of Figure 2. The nitrogen gas under pressure released upon opening of the relief chamber 6 pressurises the contents of the can as the enlarged headspace 15A is developed. However, in the embodiments of Figures 3 to 6 because the secondary chamber 5 contains nitrogen gas substantially at the same pressure as that originally in the relief chamber 6, the entry of beer into the secondary chamber 5 will be alleviated as the contents of the can come into equilibrium. Consequently when the top of the can is opened for consumption of the beer, nitrogen gas under pressure from the secondary chamber 5 will predominantly be injected by way of the restricted orifice 10 into the beer in the relief chamber 6 for the purpose of liberating gas in solution from the beer and the development of froth or foam. The predominant injection of gas into the beer for the development of froth may, for some beverages, be preferred to liquid injection.

It will be appreciated that the sealed composite insert shown in Figure 3 or in Figure 5 as supplied to the can will alleviate the possibility of either the secondary chamber 5 or the relief chamber 6 being contaminated with atmospheric oxygen either during the storage of the composite insert or its transfer to a can in the packaging line.

In the arrangement shown in Figures 7 and 8 the hollow insert 8 for the relief chamber 6 has a top closure in the form of a burst sheet, conveniently of disc shape, 20. A non-return valve 21 is located in a bottom wall 22 of the insert 8 to permit communication, in response to an appropriate pressure differential, in a direction from the primary chamber 1A into the relief chamber 6. Following beer charging and sealing, the can 1 is subjected to pasteurisation for which purpose it is inverted, in accordance with conventional practice, prior to being heated. Upon inversion the non-return valve 21 communicates with the small headspace 15 and in response to the heat applied during pasteurisation, the gas pressure in the headspace 15 increases at a greater rate than that in the relief chamber 6. This causes the non-return valve 21 to open and maintain the pressure in the relief chamber 6 in equilibrium with that in the small headspace 15. Upon cooling the can following pasteurisation, either with the can upright or inverted, the gas pressure in the relief chamber 6 decreases at a slower rate than the gas pressure in the small headspace 15. As a consequence the sheet 20 is subjected to a pressure differential causing it to burst outwardly of the insert 8 as shown in Figure 8. The open insert 8 now receives beer from the primary chamber 1A to provide the enlarged headspace 15A. When the can top 4 is opened for consumption of the beer, gas in solution in the beer may be liberated for developing froth or foam in the enlarged headspace by ultrasonic stimulation or otherwise as discussed in our British Patent No. 1,588,624. The burst sheet 20 may be moulded in a heat shrink plastics material and designed so that when subjected to the heat of pasteurisation the structure of the sheet is weakened adequately to ensure that it will burst in response to the pressure differential to which it will subsequently be subjected. It will be realised that the arrangements discussed with reference to Figures 7 and 8 for opening of the relief chamber 6 can be applied to the embodiments of the present invention.

Although the present invention has been discussed in relation to a container in the form of a can, it will be appreciated that the invention may be utilised with other forms of containers such as glass or plastics bottles and cartons.

Claims

1. A beverage package comprising a sealed container (1) having a primary chamber (1A) accommodating beverage having gas in solution and which gas is to be liberated to provide froth or foam in a headspace (15) of the primary chamber; froth developing means (5, 10) responsive to a pressure differential created by opening of the sealed container to liberate gas from solution in the beverage and form froth or foam in the headspace, and a relief chamber (6) which is closed to communication with the beverage in the primary chamber (1A) when the container is sealed and is openable subsequent to said sealing and prior to opening of the sealed container whereby, on opening said relief chamber (6), a proportion of beverage derived from the primary chamber (1A) is accommodated in the relief chamber (6) to enlarge said headspace (15A) for accommodating froth or foam developed therein.

2. A package as claimed in claim 1 in which the relief chamber (6) contains gas under pressure greater than atmospheric and when opened to accommodate beverage said gas in the relief chamber is released to increase pressure in the enlarged headspace which is developed in the primary chamber.

3. A package as claimed in either claim 1 or claim 2 in which the relief chamber (6) is arranged to open to accommodate beverage from the primary chamber and so that beverage from the relief chamber will be dispensed from the container when opened together with beverage from the primary chamber.

4. A package as claimed in any one of the preceding claims in which the relief chamber (6) comprises a closure (11) arranged to respond to treatment of the package with the container sealed so that the relief chamber is caused to open.

5. A package as claimed in claim 4 in which the closure (11) is arranged to open the relief chamber in response to heat applied to the package.

6. A package as claimed in either claim 4 or claim 5 in which the closure (20) is arranged to open the relief chamber (6) in response to a pressure differential created between pressure of gas within the relief chamber and a relatively lower pressure in the primary chamber externally of the relief chamber.

7. A package as claimed in any one of claims 4 to 6 in which the closure comprises a cap (11) which is displaced from a condition in which it seals the relief chamber (6) to a condition in which the relief chamber is opened to the primary chamber (1A).

8. A package as claimed in claim 7 in which the cap (11) is hingedly mounted (13) to be retained by said mounting within the container.

9. A package as claimed in claim 6 in which the closure comprises a sheet (20) which is intended to burst in response to said pressure differential so that the burst sheet will open outwardly of the relief chamber (6) to provide communication between the relief and primary chambers.

10. A package as claimed in any one of the preceding claims in which the relief chamber (6) is formed to include plastics material, the dimensions of which undergo a change in response to heat applied thereto and which change is arranged so that the relief chamber will open to communication with the primary chamber.

11. A package as claimed in any one of the preceding claims in which the relief chamber (6) comprises a non-return valve (21) which opens to provide communication between the primary chamber (1A) and the relief chamber (6) solely in response to a pressure differential created by pressure in the primary chamber (1A) being greater than pressure in the relief chamber (6).

12. A package as claimed in any one of the preceding claims in which the relief chamber is formed by a hollow insert (8) located and retained at a predetermined position within the container (1).

13. A package as claimed in any one of the preceding claims in which the froth developing means comprises a secondary chamber (5) from which secondary chamber at least one of liquid and gas is to be injected into the beverage for effecting said liberation of gas from solution.

14. A package as claimed in claim 13 in which the secondary chamber (5) is located to provide said injection into beverage in the primary chamber.

15. A package as claimed in claim 13 in which said secondary chamber (5) is arranged to provide said injection into beverage accommodated by the relief chamber (6) when said relief chamber (6) has opened to communication with the primary chamber (1A).

16. A package as claimed in claim 15 in which the openable relief chamber (6) is closed to communication with the primary chamber (1A) and closure of the relief chamber closes communication between the secondary chamber (5) and the primary chamber (1A).

17. A package as claimed in claim 16 in which the secondary chamber (5) communicates with the relief chamber (6) by way of a restricted aperture or orifice (10) and wherein said relief and secondary chambers contain gas at substantially equal pressure.

18. A package as claimed in any one of claims 13 to 17 in which the secondary chamber is formed as a hollow insert part (7) located and secured within the container (1).

19. A package as claimed in claim 18 in which the relief chamber (6) comprises a further hollow insert part (8) which is coupled to or formed with the insert part (7) of the secondary chamber (5) to provide a unified insert structure.

20. A package as claimed in either claim 18 or claim 19 when appendant to claim 15 in which the insert part (7) of the secondary chamber (5) is located within the relief chamber (6).

21. A package as claimed in any one of the preceding claims in which the container is sealed and in which the relief chamber (6) has opened to accommodate beverage derived from the primary chamber (1A).

22. A method of packaging a beverage having gas in solution which comprises providing a container (1) with a primary chamber (1A) and a relief chamber (6) which is closed to the primary chamber, providing the container (1) with froth developing means (5, 10), charging the primary chamber (1A) with the beverage and sealing the container to form a pressurised headspace (15) in the primary chamber so that the froth developing means (5, 10) is responsive to a pressure differential created by opening of the sealed container for liberating gas from solution in the beverage to form froth or foam in the headspace of the primary chamber, and with the container sealed, opening the relief chamber (6) to accommodate beverage derived from the primary chamber (1A) and thereby enlarge the headspace (15A) in the primary chamber for accommodating froth or foam developed by liberation of gas from the beverage on subsequent opening of the sealed container.

23. A method as claimed in claim 22 and which comprises providing gas under pressure within the relief chamber (6) and opening the relief chamber so that the gas released therefrom pressurises the headspace (15A) in the primary chamber.

24. A method as claimed in either claim 22 or claim 23 which comprises forming the relief chamber (6) with a material the characteristics of which are responsive to heat and heating the package to change said material characteristics so that said change effects in opening of the relief chamber (6) to communication with the primary chamber (1A).

25. A method as claimed in any one of claims 22 to 24 which comprises forming the relief chamber (6) as a sealed but openable hollow insert part (8) and locating that insert part within the container (1) prior to closing and sealing the container.

26. A method as claimed in claim 25 when appendant to claim 23 which comprises gas pressurising the relief chamber (6) of the sealed hollow insert part (8) remote from the container.

27. A method as claimed in any one of claims 22 to 26 which comprises providing a secondary chamber (5) for said froth developing means and from which secondary chamber at least one of liquid and gas is to be injected into the beverage to provide said liberation of gas from solution.

28. A method as claimed in claim 27 which comprises locating said secondary chamber (5) for said injection to be effected into beverage in the primary chamber (1A).

29. A method as claimed in claim 27 which comprises locating said secondary chamber (5) for said injection to be effected into beverage accommodated by the relief chamber (6) when said relief chamber (6) has opened to communication with the primary chamber.

30. A method as claimed in any one of claims 27 to 29 which comprises forming the secondary chamber (5) as a hollow insert part (7) and locating that insert part (7) within the container (1) prior to closing and sealing the container.

31. A method as claimed in claim 30 when appendant to claim 25 which comprises coupling or forming together the insert part (8) of the relief chamber (6) and the insert part (7) of the secondary chamber (5) to provide a unified insert structure and inserting that insert structure within the container (1).

32. A method as claimed in claim 31 when appendant to claim 29 which comprises providing a restricted aperture or orifice (10) through which the secondary chamber (5) communicates with the relief chamber (6), pressurising with gas said relief and pressure chambers, sealing said pressurized chambers whilst permitting communication therebetween by way of said restricted aperture or orifice (10) and locating the sealed insert structure within the container (1).

33. A method as claimed in any one of claims 22 to 32 which comprises opening the relief chamber (6) to

communication with the primary chamber (1A) by subjecting the container to at least one of vibration, centrifugal force and peristalsis.

Patentansprüche

1. Getränkeverpackung mit einem versiegelten Behälter (1), der eine Primärkammer (1A) zur Aufnahme eines Getränks mit einem in Lösung befindlichen Gas aufweist, wobei das Gas freigesetzt werden soll, um eine Krone oder einen Schaum in einem Luftraum (15) der Primärkammer bereitzustellen; eine Einrichtung (5, 10) zum Entwickeln von Schaum in Abhängigkeit von einem Druckunterschied, der durch ein Öffnen des versiegelten Behälters geschaffen wird, um das Gas aus der Lösung in dem Getränk freizusetzen und eine Krone oder Schaum in dem Luftraum zu bilden, und eine Entlastungskammer (6), die für eine Verbindung mit dem Getränk in der Primärkammer (1A) geschlossen ist, wenn der Behälter versiegelt ist, und die nach dem Versiegeln und vor dem Öffnen des versiegelten Behälters zu öffnen ist, wodurch bei einer Öffnung der Entlastungskammer (6) ein aus der Primärkammer (1A) erhaltener Teil des Getränks in der Entlastungskammer (6) aufgenommen wird, um den Luftraum (15A) für eine Aufnahme der darin entwikkelten Krone oder des Schaums zu vergrößern.

2. Verpackung nach Anspruch 1, bei welcher die Entlastungskammer (6) ein Gas unter einem Druck größer als der atmosphärische Druck enthält und bei ihrer Öffnung zur Aufnahme des Getränks das Gas in der Entlastungskammer freigesetzt wird, um den Druck in dem vergrößerten Luftraum zu erhöhen, der in der Primärkammer entwickelt wird.

3. Verpackung nach Anspruch 1 oder Anspruch 2, bei welcher die Entlastungskammer (6) für eine Öffnung angeordnet ist, um Getränk aus der Primärkammer aufzunehmen, sowie derart, daß das Getränk aus der Entlastungskammer von dem Behälter bei der Öffnung abgegeben wird zusammen mit dem Getränk aus der Primärkammer.

4. Verpackung nach einem der vorhergehenden Ansprüche, bei welcher die Entlastungskammer (6) einen Verschluß (11) aufweist, der für ein Ansprechen auf eine Bearbeitung der Verpackung bei versiegeltem Behälter angeordnet ist, sodaß die Entlastungskammer zum Öffnen gebracht wird.

5. Verpackung nach Anspruch 4, bei welcher der Verschluß (11) für ein Öffnen der Entlastungskammer in Abhängigkeit von Wärme angeordnet ist, die an die Verpackung angelegt wird.

6. Verpackung nach Anspruch 4 oder Anspruch 5, bei welcher der Verschluß (20) für ein Öffnen der Entlastungskammer (6) in Abhängigkeit von einem Druckunterschied angeordnet ist, der zwischen dem Gasdruck innerhalb der Entlastungskammer und einem relativ niedrigeren Druck in der Primärkammer außerhalb der Entlastungskammer geschaffen wird.

7. Verpackung nach einem der Ansprüche 4 bis 6, bei welcher der Verschluß eine Kappe (11) aufweist, die aus einer Lage, in welcher sie die Entlastungskammer (6) versiegelt, in eine Lage verschiebbar ist, in welcher die Entlastungskammer gegen die Primärkammer (1A) geöffnet ist.

8. Verpackung nach Anspruch 7, bei welcher die Kappe (11) über ein Scharnier (13) befestigt ist, um durch diese Befestigung innerhalb des Behälters zurückbehalten zu werden.

9. Verpackung nach Anspruch 6, bei welcher der Verschluß ein Feinblech (20) aufweist, welches in Abhängigkeit von dem Druckunterschied zum Platzen gebracht werden soll, sodaß das geplatzte Feinblech sich nach außerhalb der Entlastungskammer (6) öffnet, um eine Verbindung zwischen den Entlastungs- und Primärkammern zu schaffen.

10. Verpackung nach einem der vorhergehenden Ansprüche, bei welcher die Entlastungskammer (6) unter Einschluß von Kunststoffmaterial geformt ist, dessen Abmessungen einer Änderung in Abhängigkeit von daran angelegter Wärme unterliegen, wobei die Änderung derart arrangiert ist, daß sich die Entlastungskammer für eine Verbindung mit der Primärkammer öffnet.

11. Verpackung nach einem der vorhergehenden Ansprüche, bei welcher die Entlastungskammer (6) ein Rückschlagventil (21) aufweist, welches sich für die Bereitstellung einer Verbindung zwischen der Primärkammer (1A) und der Entlastungskammer (6) lediglich in Abhängigkeit von einem Druckunterschied öffnet, der durch den Druck in der Primärkammer (1A) geschaffen wird, welcher größer als der Druck in der Entlastungskammer (6) ist.

12. Verpackung nach einem der vorhergehenden Ansprüche, bei welcher die Entlastungskammer durch einen hohlen Einsatz (8) geformt ist, der in einer vorbestimmten Position innerhalb des Behälters (1) angeordnet und zurückgehalten ist.

13. Verpackung nach einem der vorhergehenden Ansprüche, bei welchem die Einrichtung zum Entwickeln von Schaum eine Sekundärkammer (5) aufweist, aus welcher wenigstens das eine von Flüssigkeit und Gas in das Getränk injiziert werden soll, um die Freisetzung von Gas aus der Lösung zu bewirken.

14. Verpackung nach Anspruch 13, bei welcher die Sekundärkammer (5) für die Bereitstellung der Injektion in das Getränk in der Primärkammer angeordnet ist.

15. Verpackung nach Anspruch 13, bei welcher die Sekundärkammer (5) für die Bereitstellung der Injektion in das durch die Entlastungskammer (6) aufgenommene Getränk angeordnet ist, wenn die Entlastungskammer (6) für eine Verbindung mit der Primärkammer (1A) geöffnet wurde.

16. Verpackung nach Anspruch 15, bei welcher die zu öffnende Entlastungskammer (6) für eine Verbindung mit der Primärkammer (1A) geschlossen ist und der Verschluß der Entlastungskammer die Verbindung zwischen der Sekundärkammer (5) und der Primärkammer (1A) schließt.

17. Verpackung nach Anspruch 16, bei welcher die Sekundärkammer (5) mit der Entlastungskammer (6) über eine eingeschränkte Öffnung oder Drossel (10) verbunden ist und bei welcher die Entlastungs- und Sekundärkammer ein Gas unter einem im wesentlichen gleichen Druck enthalten.

18. Verpackung nach einem der Ansprüche 13 bis 17, bei welcher die Sekundärkammer als ein hohler Einsatzteil (7) ausgebildet ist, der innerhalb des Behälters (1) angeordnet und befestigt ist.

19. Verpackung nach Anspruch 18, bei welcher die Entlastungskammer (6) einen weiteren hohlen Einsatzteil (8) aufweist, der mit dem Einsatzteil (7) der Sekundärkammer (5) gekuppelt oder damit ausgebildet ist, um ein vereinigtes Einsatzgebilde bereitzustellen.

20. Verpackung nach Anspruch 18 oder Anspruch 19 in der Rückbeziehung auf Anspruch 15, bei welcher der Einsatzteil (7) der Sekundärkammer (5) innerhalb der Entlastungskammer (6) angeordnet ist.

21. Verpackung nach einem der vorhergehenden Ansprüche, bei welcher der Behälter versiegelt ist und bei welcher die Entlastungskammer (6) geöffnet ist für eine Aufnahme von Getränk, das aus der Primärkammer (1A) abgeleitet ist.

22. Verfahren zum Verpacken eines Getränks mit einem in Lösung befindlichen Gas, welches aus der Bereitstellung eines Behälters (1) mit einer Primärkammer (1A) und einer Entlastungskammer (6) besteht, die zu der Primärkammer geschlossen ist, der Bereitstellung des Behälters (1) mit einer Einrichtung (5, 10) zum Entwickeln von Schaum, dem Füllen der Primärkammer (1A) mit dem Getränk und dem Versiegeln des Behälters zur Ausbildung eines mit Druck beaufschlagten Luftraumes (15) in der Primärkammer, sodaß die Einrichtung (5, 10) zum Entwickeln von Schaum abhängig ist von einem Druckunterschied, der durch ein Öffnen des versiegelten Behälters für eine Freisetzung von Gas aus der Lösung in dem Getränk geschaffen wird, um eine Krone oder Schaum in dem Luftraum der Primärkammer zu bilden, wobei die Entlastungskammer (6) bei versiegeltem Behälter geöffnet wird, um aus der Primärkammer (1A) abgeleitetes Getränk aufzunehmen und dadurch den Luftraum (15A) in der Primärkammer für eine Aufnahme einer Krone oder von Schaum zu vergrößern, der durch eine Freisetzung von Gas aus dem Getränk bei dem nachfolgenden Öffnen des versiegelten Behälters entwickelt wird.

23. Verfahren nach Anspruch 22, welches aus der Bereitstellung von Gas unter Druck innerhalb der Entlastungskammer (6) und einem Öffnen der Entlastungskammer besteht, sodaß das dort freigesetzte Gas den Luftraum (15A) in der Primärkammer unter Druck setzt.

24. Verfahren nach Anspruch 22 oder Anspruch 23, welches aus der Ausbildung der Entlastungskammer (6) mit einem Material besteht, dessen Eigenschaften auf Wärme ansprechen, und aus einer Erwärmung der Verpackung für eine Änderung dieser Materialeigenschaften, sodaß diese Änderung ein Öffnen der Entlastungskammer (6) für eine Verbindung mit der Primärkammer (1A) bewirkt.

25. Verfahren nach einem der Ansprüche 22 bis 24, welches aus der Ausbildung der Entlastungskammer (6) als ein versiegeltes, jedoch zu öffnendes hohles Einsatzteil (8) besteht und der Anordnung dieses Einsatzteils innerhalb des Behälters (1) vor dem Verschließen und dem Versiegeln des Behälters.

26. Verfahren nach Anspruch 25 in der Rückbeziehung auf Anspruch 23, welches ein Gas umfaßt, das die Entlastungskammer (6) des versiegelten hohlen Einsatzteils (8) fern von dem Behälter unter Druck setzt.

27. Verfahren nach einem der Ansprüche 22 bis 26, welches die Bereitstellung einer Sekundärkammer (5) für die Einrichtung zum Entwickeln von Schaum umfaßt, wobei von dieser Sekundärkammer wenigstens eines von Flüssigkeit und Gas in das Getränk injiziert werden soll, um die Freisetzung von Gas aus der Lösung bereitzustellen.

28. Verfahren nach Anspruch 27, welches die Anordnung der Sekundärkammer (5) für das Bewirken der Einspritzung in das Getränk in der Primärkammer (1A) umfaßt.

29. Verfahren nach Anspruch 27, welches die Anordnung der Sekundärkammer (5) für das Bewirken der Einspritzung in das durch die Entlastungskammer (6) aufgenommene Getränk umfaßt, wenn die Entlastungskammer (6) für eine Verbindung mit der Primärkammer geöffnet wurde.

30. Verfahren nach einem der Ansprüche 27 bis 29, welches die Ausbildung der Sekundärkammer (5) als ein hohler Einsatzteil (7) umfaßt und die Anordnung dieses Einsatzteils (7) innerhalb des Behälters (1) vor dem Verschließen und Versiegeln des Behälters.

31. Verfahren nach Anspruch 30 in der Rückbeziehung auf Anspruch 25, welches ein Kuppeln oder eine gemeinsame Ausbildung des Einsatzteils (8) der Entlastungskammer (6) und des Einsatzteils (7) der Sekundärkammer (5) umfaßt für die Bereitstellung eines vereinigten Einsatzgebildes und das Einsetzen dieses Einsatzgebildes in den Behälter (1).

32. Verfahren nach Anspruch 31 in der Rückbeziehung auf Anspruch 29, welches die Bereitstellung einer beschränkten Öffnung oder einer Drossel (10) umfaßt, durch welche hindurch die Sekundärkammer(5)mit der Entlastungskammer (6) verbunden ist, eine Druckbeaufschlagung der Entlastungs- und Druckkammern mit Gas, ein Versiegeln der unter Druck gesetzten Kammern bei gleichzeitiger Ermöglichung einer Verbindung zwischen diesen über die beschränkte Öffnung oder die Drossel (10) und eine Anordnung des versiegelten Einsatzgebildes innerhalb des Behälters (1).

33. Verfahren nach einem der Ansprüche 22 bis 32, welches ein Öffnen der Entlastungskammer (6) für eine Verbindung mit der Primärkammer (1A) durch eine Unterwerfung des Behälters unter wenigstens eines einer Vibration, einer Zentrifugalkraft und einer Peristaltik umfaßt.

Revendications

1. Emballage pour boisson comprenant un récipient scellé (1) muni d'une chambre primaire (1A) recevant une boisson contenant du gaz en solution, ce gaz devant être libéré pour former de la mousse ou de l'écume dans un espace de tête (15) de la chambre primaire ; des moyens de développement de mousse (5, 10) répondant à une différence de pression créée par l'ouverture du récipient scellé, afin de libérer le gaz en solution dans la boisson et de former de la mousse au de l'écume dans l'espace de tête ; et une chambre de décharge (6) qui est fermée à la communication avec la boisson contenue dans la chambre primaire (1A) lorsque la récipient est scellé, et qui peut s'ouvrir après le fermeture étanche et avant qu'on ouvre le récipient scellé, de façon que, à l'ouverture de la chambre de décharge (6), une proportion de boisson provenant de la chambre primaire (1A) vienne remplir la chambre de décharge (6) pour agrandir l'espace de tête (15A) destiné à recevoir la mousse ou l'écume développées dans celui-ci.

2. Emballage selon la revendication 1, dans lequel la chambre de décharge (6) contient du gaz sous une pression supérieure à la pression atmosphérique et, lorsque la chambre de décharge est ouverte pour recevoir la boisson, le gaz contenu dans cette chambre de décharge est libéré pour augmenter la pression dans l'espace de tête agrandi qui est développé dans la chambre primaire.

3. Emballage selon l'une ou l'autre des revendications 1 ou 2, dans lequel la chambre de décharge (6) est conçue pour s'ouvrir afin de recevoir la boisson provenant de la chambre primaire, et de façon que la boisson provenant de la chambre de décharge soit distribuée par le récipient une fois ouvert, en même temps que la boisson provenant de la chambre primaire.

4. Emballage selon l'une quelconque des revendications précédentes, dans lequel la chambre de décharge (6) comprend une fermeture (11) conçue pour répondre à un traitement de l'emballage lorsque le récipient est scellé, de façon que la chambre de décharge soit amenée à s'ouvrir.

5. Emballage selon la revendication 4, dans lequel la fermeture (11) est conçue pour ouvrir la chambre de décharge en réponse à l'application de chaleur à l'emballage.

6. Emballage selon l'une ou l'autre des revendications 4 ou 5, dans lequel la fermeture (20) est conçue pour ouvrir la chambre de décharge (6) en réponse à une différence de pression créée entre la pression de gaz à l'intérieur de la chambre de décharge et une pression relativement plus basse dans la chambre primaire à l'extérieur de la chambre de décharge.

7. Emballage selon l'une quelconque des revendications 4 à 6, dans lequel la fermeture comprend un couvercle (11) qui est déplacé pour passer d'un état dans lequel il ferme de manière étanche la chambre de décharge (6), à un état dans lequel la chambre de décharge est ouverte à la chambre primaire (1A).

8. Emballage selon la revendication 7, dans lequel le couvercle (11) est monté de manière articulée (13) pour être retenu par la monture à l'intérieur du récipient.

9. Emballage selon la revendication 6, dans lequel la fermeture comprend une feuille (20) qui est destinée à éclater en réponse à la différence de pression, de

façon que cette feuille d'éclatement s'ouvre vers l'extérieur de la chambre de décharge (6), pour assurer la communication entre cette chambre de décharge et la chambre primaire.

10. Emballage selon l'une quelconque des revendications précédentes, dans lequel la chambre de décharge (6) est formée pour comprendre une matière plastique dont les dimensions subissent un changement en réponse à la chaleur qui lui est appliquée, ce changement étant prévu de façon que la chambre de décharge s'ouvre à la communication avec la chambre primaire.

11. Emballage selon l'une quelconque des revendications précédentes, dans lequel la chambre de décharge (6) comprend un clapet anti-retour (21) qui s'ouvre pour assurer la communication, entre la chambre primaire (1A) et la chambre de décharge (6), uniquement en réponse à une différence de pression créée lorsque la pression dans la chambre primaire (1A) est supérieure à la pression dans la chambre de décharge (6).

12. Emballage selon l'une quelconque des revendications précédentes, dans lequel la chambre de décharge est formée par une pièce d'insertion creuse (8) placée et retenue dans une position prédeterminée à l'intérieur du récipient (1).

13. Emballage selon l'une quelconque des revendications précédentes, dans lequel les moyens de développement de mousse comprennent une chambre secondaire (5) à partir de laquelle l'un au moins d'un liquide et d'un gaz doit être injecté dans la boisson pour produire la libération du gaz en solution.

14. Emballage selon la revendication 13, dans lequel la chambre secondaire (5) est placée pour produite l'injection dans la boisson contenue dans la chambre primaire.

15. Emballage selon la revendication 13, dans lequel la chambre secondaire (5) est conçue pour produire l'injection dans la boisson reçue par la chambre de décharge (6), lorsque cette chambre de décharge (6) s'est ouverte à la communication avec la chambre primaire (1A).

16. Emballage selon la revendication 15, dans lequel la chambre de décharge pouvant s'ouvrir (6) est fermée à la communication avec la chambre primaire (1A), et la fermeture de la chambre de décharge ferme la communication entre la chambre secondaire (5) et la chambre primaire (1A).

17. Emballage selon la revendication 16, dans lequel la chambre secondaire (5) communique avec la chambre de décharge (6) au moyen d'une ouverture ou d'un orifice restreint (10), et dans lequel la chambre de décharge et la chambre secondaire contiennent du gaz essentiellement à la même pression.

18. Emballage selon l'une quelconque des revendications 13 à 17, dans lequel la chambre secondaire est réalisée sous la forme d'une pièce d'insertion creuse (7) placée et fixée à l'intérieur du récipient (1).

19. Emballage selon la revendication 18, dans lequel la chambre de décharge (6) comprend une autre pièce d'insertion creuse (8) qui est couplée ou intégrée à la pièce d'insertion (7) de la chambre secondaire (5), pour former une structure d'insertion intégrée.

20. Emballage selon l'une ou l'autre des revendications 18 ou 19 lorsqu'elles dépendent de la revendication 15, dans lequel la pièce d'insertion (7) de la chambre secondaire (5) est placée à l'intérieur de la chambre de décharge (6).

21. Emballage selon l'une quelconque des revendications précédentes, dans lequel le récipient est scellé, et dans lequel la chambre de décharge (6) s'est ouverte pour recevoir de la boisson provenant de la chambre primaire (1A).

22. Procédé d'emballage d'une boisson comportant du gaz en solution, qui consiste à utiliser un récipient (1) muni d'une chambre primaire (1A) et d'une chambre de décharge (6) fermée par rapport à la chambre primaire, à équiper le récipient (1) de moyens de développement de mousse (5, 10), à remplir la chambre primaire (1A) par la boisson et à sceller le récipient pour former un espace de tête dépressurisé (15) dans la chambre primaire, de façon que les moyens de développement de mousse (5, 10) répondent à une différence de pression créée par l'ouverture du récipient scellé, afin de libérer le gaz en solution dans la boisson pour former de la mousse ou de l'écume dans l'espace de tête de la chambre primaire, et, lorsque le récipient est scellé, à ouvrir la chambre de décharge (6) pour qu'elle reçoive de la boisson provenant de la chambre primaire (1A), en agrandissant ainsi l'espace de tête (15a) dans la chambre primaire pour recevoir la mousse ou l'écume développées par la libération du gaz provenant de la boisson lorsqu'on ouvre ensuite le récipient scellé.

23. Procédé selon la revendication 22, qui consiste à utiliser du gaz sous pression à l'intérieur de la chambre de décharge (6) et à ouvrir cette chambre de décharge de façon que le gaz libéré de celle-ci pressurise l'espace de tête (15A) dans la chambre primaire.

24. Procédé selon l'une ou l'autre des revendications 22 ou 23, qui consiste à réaliser la chambre de décharge (6) dans un matériau dont les caractéristiques répondent à la chaleur et au chauffage de l'emballage, pour modifier les caractéristiques de ce matériau de façon que son changement produise l'ouverture de la chambre de décharge (6) à la communication avec la chambre primaire (1A).

25. Procédé selon l'une quelconque des revendications 22 à 24, qui consiste à réaliser la chambre de décharge (6) sous la forme d'une pièce d'insertion creuse mais pouvant s'ouvrir (8), et à placer cette pièce d'insertion à l'intérieur du récipient (1) avant la fermeture étanche de ce récipient.

26. Procédé selon la revendication 25, lorsqu'elle dépend de la revendication 23, qui comprend la pressurisation du gaz de la chambre de décharge (6) de la pièce d'insertion creuse scellée (8), en un point éloigné du récipient.

27. Procedé selon l'une quelconque des revendications 22 à 26, qui consiste à utiliser une chambre secondaire (5) pour les moyens de développement de mousse, chambre secondaire à partir de laquelle l'un au moins d'un liquide et d'un gaz doit être injecté dans la boisson pour produire la libération du gaz de la solution.

28. Procédé selon la revendication 27, qui consiste à placer la chambre secondaire (5) pour que l'injection soit effectuée dans la boisson contenue dans la chambre primaire (1A).

29. Procédé selon la revendication 27, qui cousiste à placer la chambre secondaire (5) pour que l'injection soit effectuée dans la boisson reçue par la chambre de décharge (6) lorsque cette chambre de décharge (6) s'est ouverte à la communication avec la chambre primaire.

30. Procédé selon l'une quelconque des revendications 27 à 29, qui consiste à réaliser la chambre secondaire (5) sous la forme d'une pièce d'insertion creuse (7), et à placer cette pièce d'insertion (7) à l'intérieur du récipient (1) avant la fermeture étanche de ce récipient.

31. Procédé selon la revendication 30 lorsqu'elle dépend de la revendication 25, qui consiste à coupler ou à former ensemble la pièce d'insertion (8) de la chambre de décharge (6) et la pièce d'insertion (7) de la chambre secondaire (5), de manière à obtenir une structure d'insertion intégrée, et à introduire cette structure intégrée à l'intérieur du récipient (1).

32. Procédé selon la revendication 31 lorsqu'elle dépend de la revendication 29, qui consiste à former une ouverture ou un orifice restreint (10) par lequel la chambre secondaire (5) communique avec la chambre de décharge (6), à pressuriser de gaz la chambre de décharge et la chambre de pression, à sceller ces chambres pressurisées tout en permettant la communication entre elles au moyen de l'ouverture ou de l'orifice restreint (10), et à placer la structure d'insertion scellée à l'intérieur du récipient (1).

33. Procédé selon l'une quelconque des revendications 22 à 32, qui consiste à ouvrir la chambre de décharge (6) à la communication avec la chambre primaire (1A) en soumettant le récipient à au moins une vibration, une force centrifuge ou une force péristaltique.

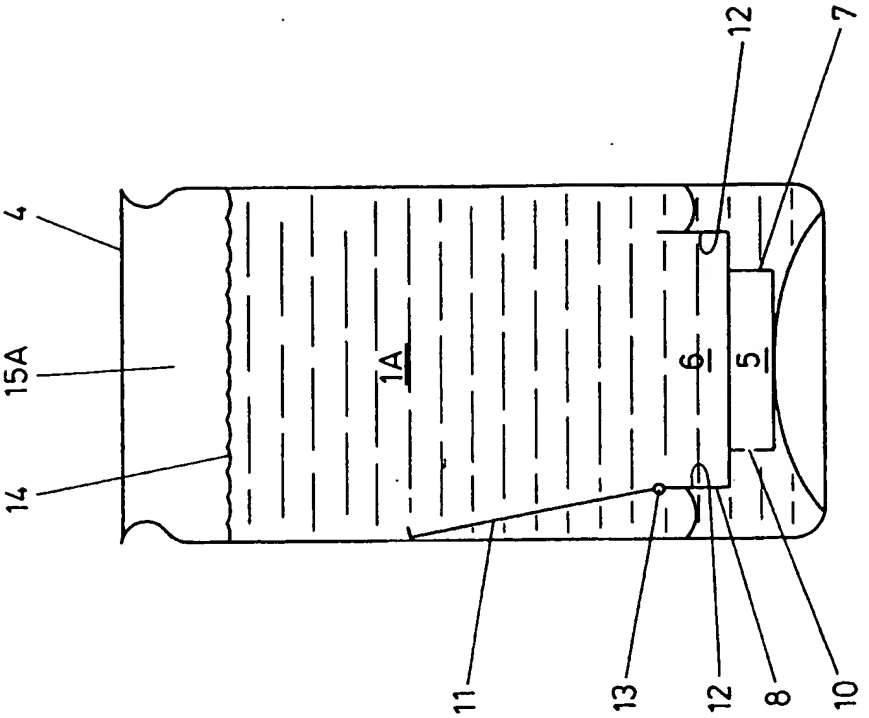

FIG. 2

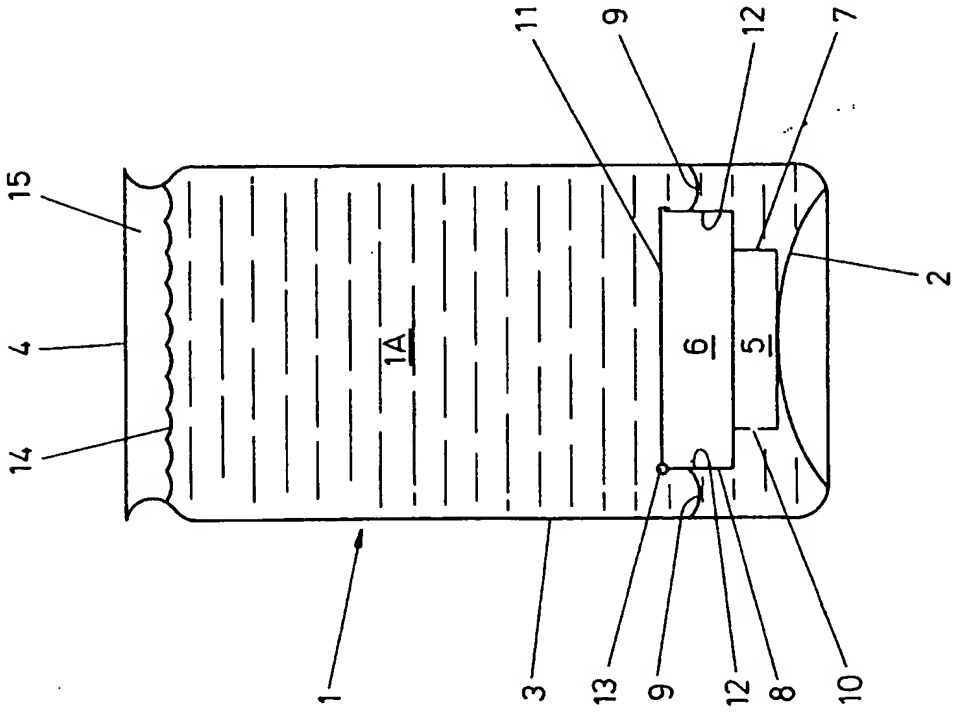

FIG. 1

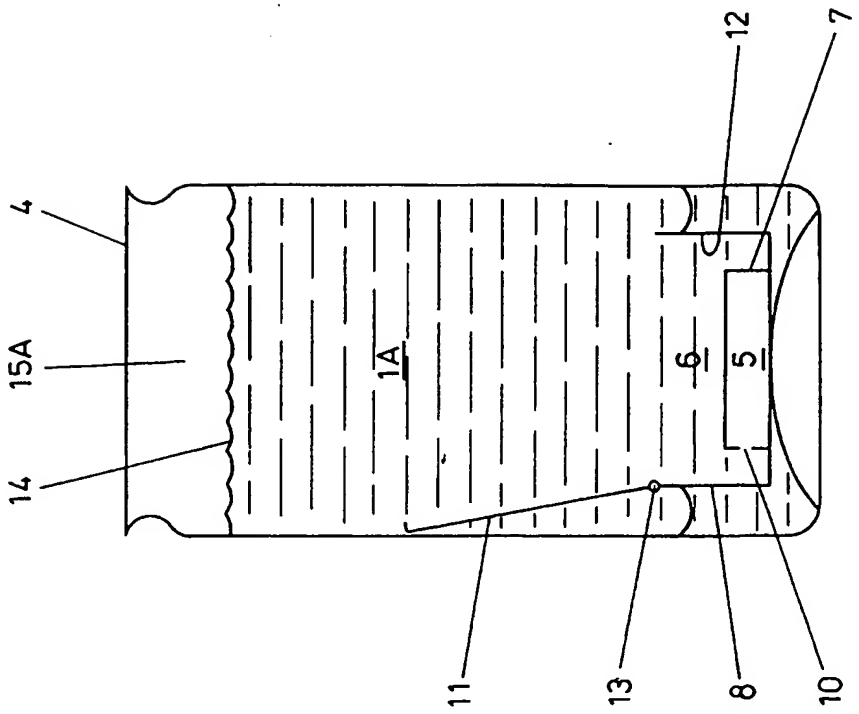

FIG. 4

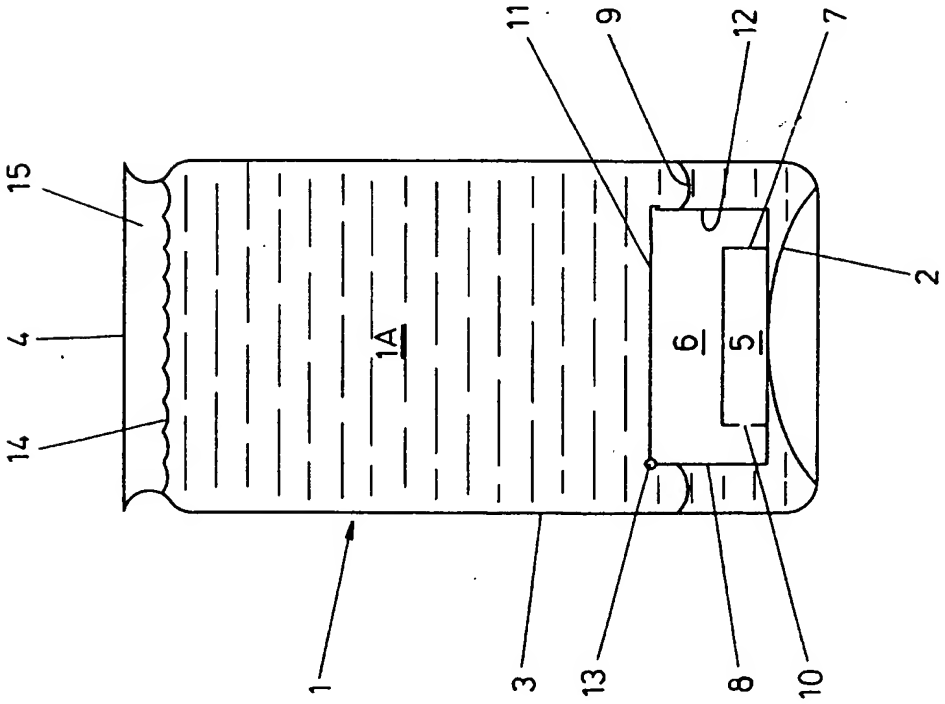

FIG. 3

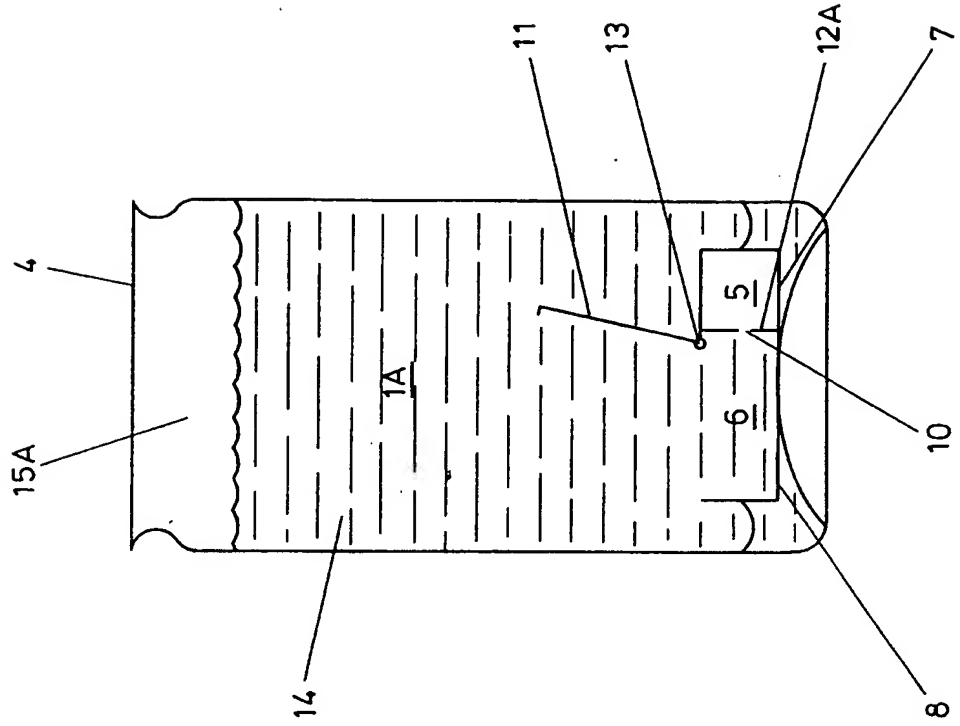

FIG. 6

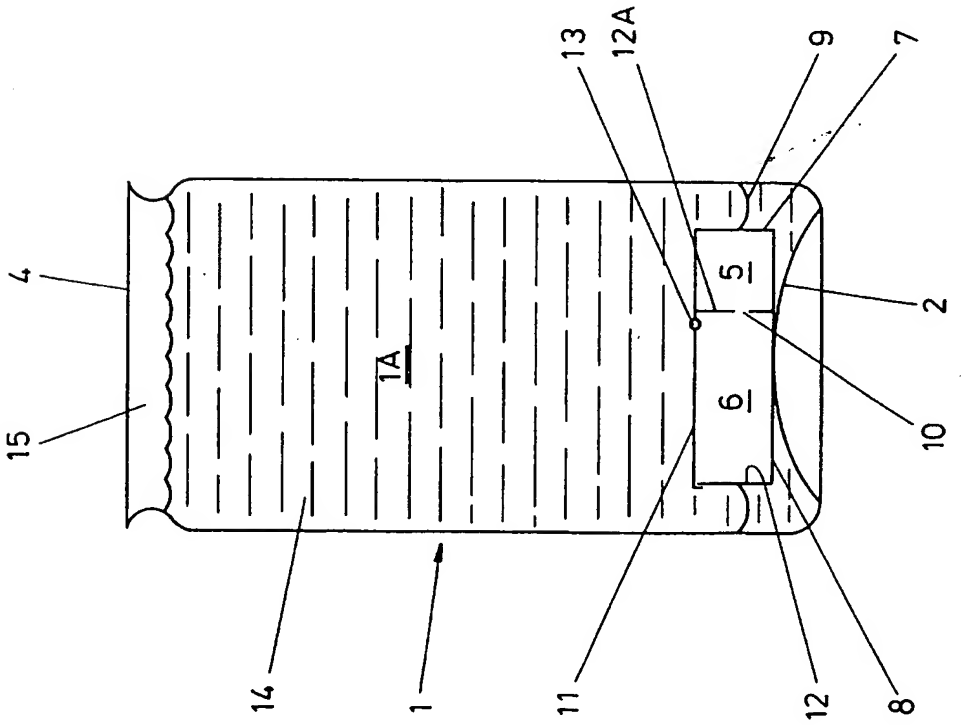

FIG. 5

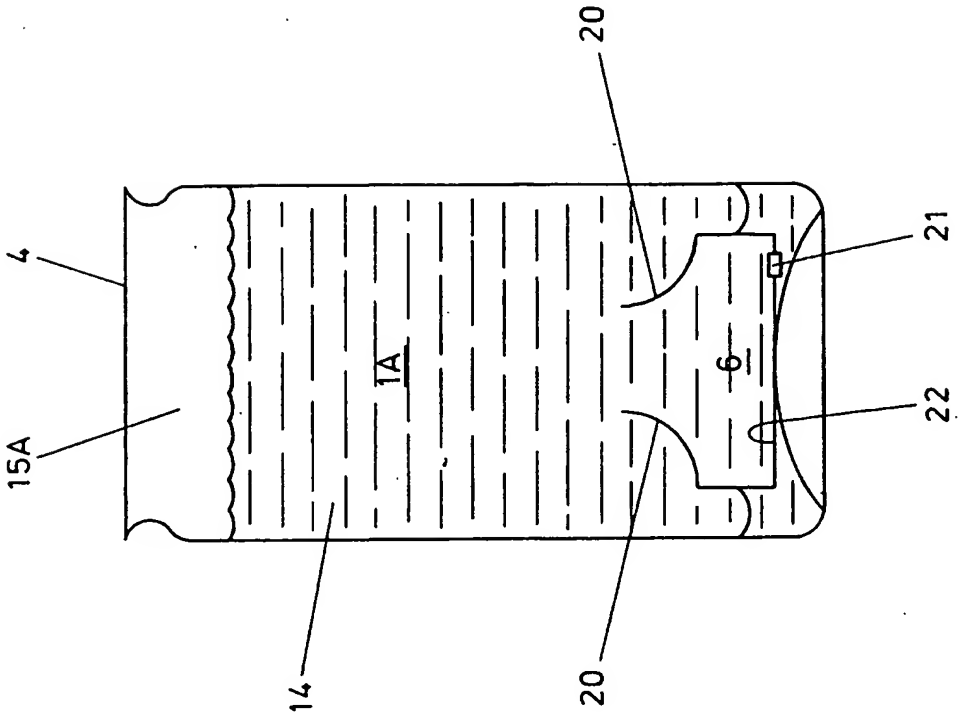

FIG. 8

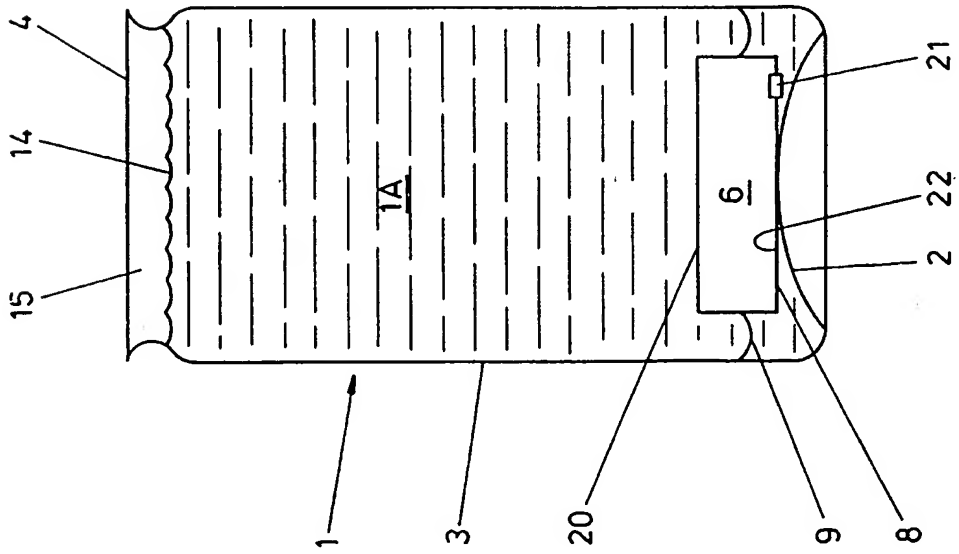

FIG. 7